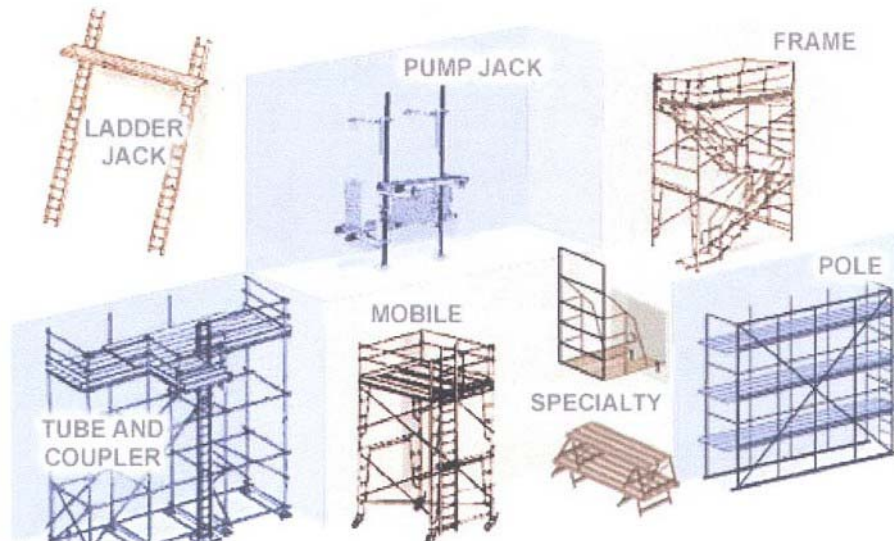


Supported Scaffolds:

Supported scaffolds consist of one or more platforms supported by outrigger beams, brackets, poles, legs, uprights, posts, frames, or similar rigid support. Because frame scaffolds are the most common type of supported scaffold, this Tool uses the Frame training module to describe requirements that are common to all supported scaffolds. Requirements specific to the other types are described only in their respective training modules.



Frame Scaffold or Fabricated Frame: Platform(s) supported on fabricated end frames with integral posts, horizontal bearers, and intermediate members.

Manually Propelled/Mobile: Unpowered, portable, caster- or wheel-mounted supported scaffold.

Pump Jack: Platform supported by vertical poles and movable support brackets.

Ladder Jack: Platform resting on brackets attached to ladders.

Tube and Coupler: Platform(s) supported by tubing, erected with coupling devices connecting uprights, braces, bearers, and runners.

Pole: Posts with fixed connection points that accept runners, bearers, and diagonals that can be interconnected at predetermined levels.

Specialty: Scaffold types designed for a narrow and very specific range of applications. Includes plasterers', decorators', and other large-area scaffolds; bricklayers' square scaffolds; horse scaffolds; outrigger scaffolds; step, platform, and trestle ladder scaffolds; form and carpenter's bracket scaffolds; window jack scaffolds; crawling boards and chicken ladders; and roof bracket scaffolds.

- **Overview**

Why Is Scaffold Safety Important?

When OSHA revised its Scaffolds standard in 1996, Bureau of Labor Statistics studies showed that 25 percent of workers injured in scaffold accidents had received no scaffold safety training, and 77 percent of scaffolds were not equipped with guardrails.

OSHA estimates that informed employers and workers, in compliance with correct safety standards, can save as many as 50 lives and prevent 4,500 accidents every year.

What Is a Scaffold?

A scaffold is defined as an elevated, temporary work platform. There are three basic types of scaffolds:

- Supported scaffolds, which consist of one or more platforms supported by rigid, load-bearing members, such as poles, legs, frames, outriggers, etc.
- Suspended scaffolds, which are one or more platforms suspended by ropes or other non-rigid, overhead support.
- Other scaffolds, principally manlifts, personnel hoists, etc., which are sometimes thought of as vehicles or machinery, but can be regarded as another type of supported scaffold.



Common Hazards Associated with All Scaffolds

- Falls from elevation, due to lack of fall protection;
- Collapse of the scaffold, caused by instability or overloading;
- Being struck by falling tools, work materials, or debris; and
- Electrocution, principally due to proximity of the scaffold to overhead power lines.

(These hazards will be addressed within the two specific groups below.)

Who Uses Scaffolds

Workers on scaffolds can be divided into two groups:

- [Erectors/Dismantlers](#)
- [Users](#)

- **Erectors/Dismantlers**

Erectors and dismantlers are workers whose principal activity involves assembling and disassembling scaffolding before other work can commence, and after that work, or a portion of it, has been completed.

Training and Competent Person Requirements

OSHA requires employers to provide training by a competent person to each employee who is involved in erecting and/or disassembling a scaffold. A competent person is defined as one who:

- Is capable of identifying existing and predictable hazards, and
- Has authorization to take prompt corrective measures to eliminate them.

Requirements for Designing and Constructing Scaffolds

Scaffolds must be designed by a qualified person and be constructed and loaded in accordance with that design. OSHA defines a qualified person as one who:

- Possesses a recognized degree, certificate, or professional standing; or
- Has extensive knowledge, training and experience; and therefore,
- Can solve or resolve problems related to the work or the project.

A qualified person must do adequate preplanning to assure the safe erection and use of the scaffold.

Preplanning includes:

- Determining the type of scaffold necessary for the job,
- Determining the maximum load of the scaffold,
- Assuring a good foundation, and
- Avoiding electrical hazards.

Common Hazards

- Access
- Collapse
- Electrical
- Falls
- Instability
- Struck-by

Other References

- [Training Requirements, 1926.454](#)
- [General Requirements, 1926.451\(a\)\(6\)](#)

- **Users**

Scaffold users are those whose work requires them, at least some of the time, to be supported by scaffolding to access the area of a structure where that work is performed.

Training or Competent Person Requirements

Employers are required by OSHA standards to have a qualified person provide training to each employee who performs work while on a scaffold. The training must enable employees to recognize the hazards associated with the type of scaffold being used and to understand the procedures to control or minimize those hazards.

OSHA defines a qualified person as one who:

- Possesses a recognized degree, certificate, or professional standing, or
- Has extensive knowledge, training and experience.

Common Hazards

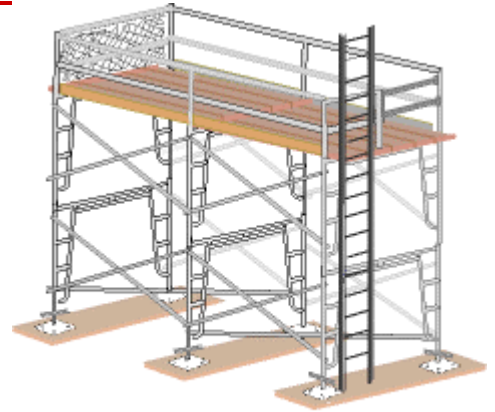
- Access
- Collapse
- Electrical
- Falls
- Struck-by

Other References

- [1926.451\(f\)](#)
- [1926.454\(a\)](#)

Frame or Fabricated

Fabricated frame scaffolds are the most common type of scaffold because they are versatile, economical, and easy to use. They are frequently used in one or two tiers by residential contractors, painters, etc., but their modular frames can also be stacked several stories high for use on large-scale construction jobs. **Note: Except where indicated, the same basic scaffold requirements that appear in this training module also apply to manually propelled, pump jack, ladder jack, tube and coupler, and pole scaffolds, as well as the specialty scaffolds described in Supported Scaffolds. Additional requirements for these scaffolds can be found in their respective training modules.**



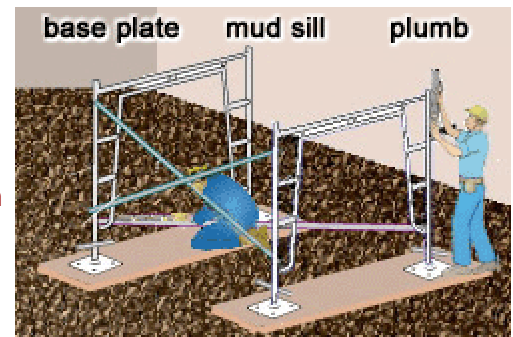
Use this training tool to review the safety requirements for a frame scaffold, in the following phases:

1. Base Section
2. Support Structure
3. Access
4. Fall Protection
5. Platform
6. Keeping Upright (Guys, Ties, etc.)
7. Electrical Hazards
8. Personnel Training and Competent Persons

1. Base Section

It is impossible for a stable structure to be built upon a foundation that does not start out square and level. OSHA has standards that apply specifically to the steps that must be taken to assure a stable scaffold base. **Note:** Except where indicated, these requirements also apply to manually propelled, pump jack, ladder jack, tube and coupler, and pole scaffolds, as well as the specialty scaffolds described in the Supported Scaffolds training module.

- a. Firm Foundation
- b. Plumb



Scaffold Collapses, Worker Injured

Case Report from OSHA files

- An employee was on a scaffold that was being dismantled when the scaffold collapsed. He fell, sustaining a concussion for which he was hospitalized. The scaffold was not secured to wooden footing supports, nor was it tied to the building.

a. Firm Foundation

- In order to **assure stability**, supported scaffolds must be set on:
 - Base plates,
 - Mud sills, or
 - Other adequate firm foundation ([Figure 3](#)). [[1926.451\(c\)\(2\)](#)]
- **Footings must be capable of supporting the loaded scaffold** without settling or displacement. [[1926.451\(c\)\(2\)\(i\)](#)]
- **Unstable objects** may not be used to support scaffolds or platform units ([Figure 1](#)). [[1926.451\(c\)\(2\)\(ii\)](#)]
- **Front-end loaders** and similar pieces of equipment shall not be used to support scaffold platforms unless they have been **specifically designed by the manufacturer** for such use. [[1926.451\(c\)\(2\)\(iv\)](#)]
- **Forklifts** shall not be used to support scaffold platforms unless:
 - the entire **platform is attached** to the fork, and

- the forklift is **not moved horizontally** while the platform is occupied.
[1926.451(c)(2)(v)]

Tip: One way to ensure a stable foundation, when a sill is used, is to secure it to the baseplate (Figure 2).



Figure1 Poor foundation: Scaffold end plates, which have no base plates, erected on top of scrap wood and unstable cement blocks. [1926.451 (c)(ii)]



Figure 2. Proper foundation on wood sills: Scaffold end frames equipped with adjustable screw legs and base plates set on mud (wood) sills.

b. Plumb

- Supported scaffold poles, frames, uprights, etc. must be **plumb and braced to prevent swaying and displacement**. In general, a level is the easiest way to achieve the desired right angles.
[1926.451(c)(3)]

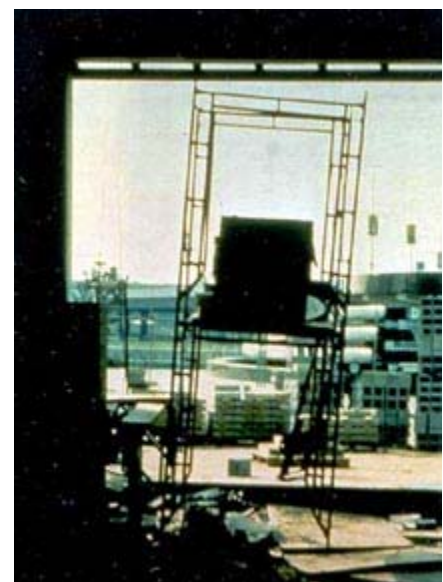
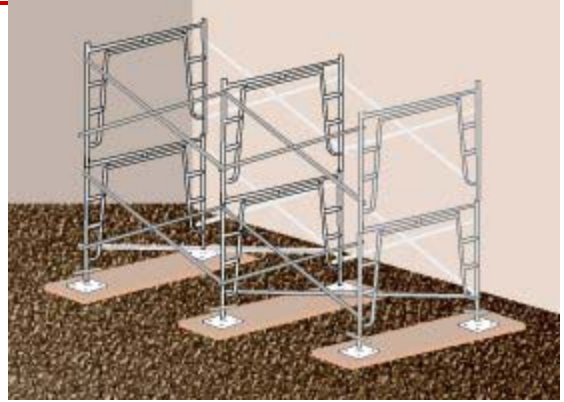


Figure 3: Scaffold is not level because it was erected without base plates on an uneven surface.

Support Structure

To control the risk of a scaffold falling or collapsing, employers must assure that scaffolds are built within OSHA standards relating to strength and structural integrity. **Note:** Except where indicated, these requirements also apply to manually propelled, pump jack, ladder jack, tube and coupler, and pole scaffolds, as well as the specialty scaffolds described in the Supported Scaffolds training module.



- a. Capacity
- b. Bracing
- c. Pinning
- d. Components

a. Capacity

- Scaffolds and scaffold components must be capable of supporting, without failure, their own weight and at least 4 times their maximum intended load ([Figure 1](#)). [[1926.451\(a\)](#)]
- Scaffolds shall be **altered** only under the supervision and direction of a **competent person**. [[1926.451\(f\)\(7\)](#)]

***TIP:** A scaffold can be overloaded by removing the braces, which causes the weight on the scaffold to be distributed to fewer structural members. Even if they are "in the way," braces should not be removed while work is being performed on a scaffold!*



Figure 1. When scaffold frames are interconnected, failure of one can cause the whole system to collapse.



Worker Falls from Collapsing Scaffold

Case Report from OSHA files

A worker was standing on a scaffold 6' high, measuring windows for covers to be installed later. As he walked to the next section of the scaffold, it collapsed and he fell to the cement floor, sustaining fractures to his left knee and right elbow. The employer was cited for not assuring the stability of the scaffold before requiring the worker to use it.

b. Bracing

- Frames and panels must be connected by **cross, horizontal, or diagonal braces**, alone or in combination, which secure vertical members together laterally. [1926.452(c)(2)]
- As frames are stacked, cross braces must be of such length as will automatically keep the scaffold **plumb, level, and square**. [[1926.452\(c\)\(2\)](#)]
- All brace connections must be secured to **prevent dislodging** ([Figure 2](#)). [[1926.452\(c\)\(2\)](#)]



Figure 2. Poor attempt at securing cross bracing with wire

TIP: A level may be used frequently during assembly to guarantee that new structural components remain in line.

c. Pinning

- Frames and panels must be joined together vertically by **coupling or stacking pins or equivalent means**. [[1926.452\(c\)\(3\)](#)]
- Frames and panels must be **locked together to prevent uplift, where uplift can occur**. Uplift is the separation of a frame from the frame below it. [[1926.452\(c\)\(4\)](#)]

TIP: Separation of frames can occur in high winds (uplift), or when workers climb endframes, overload the platform, or strike the scaffold with tools, materials, etc.



Improper Coupling Results in Two Deaths

Case Report from OSHA files

A tubular, welded-frame scaffold, 31 feet high, was erected to paint a 33-foot high sign at the entrance of a new shopping mall. After the sign had been partially painted, the scaffold was moved to allow concrete to be placed around the sign. Several days later, a crew of seven workers was instructed to replace the scaffold and finish painting the sign. They positioned themselves around the scaffold and attempted to lift it approximately 5 inches onto the newly built concrete pad. As they were lifting the scaffold, the top section partially separated from the adjoining section, toppled over, and contacted a power line. A 28-year old carpenter and a 31-year old laborer were electrocuted. The other five workers were hospitalized with electrical burns.

d. Components

- Scaffold components manufactured by different manufacturers are **not allowed to be modified to make them fit together**, unless a competent person determines that the resulting scaffold is structurally sound. [[1926.451\(b\)\(10\)](#)]
- Scaffold components manufactured by different manufacturers **must not be intermixed**, unless they fit together without being forced and the scaffold's structural integrity is maintained. [[1926.451\(b\)\(10\)](#)]
- Scaffold components made of **dissimilar metals must not be used together** unless a competent person has determined that galvanic action will not reduce the strength of any component below OSHA standards. [[1926.451\(b\)\(11\)](#)]

3. Access

Workers are most vulnerable to fall hazards when climbing on or off a scaffold. Therefore, employers are required to provide safe scaffold access. Erectors and dismantlers face additional access problems due to the incomplete condition of the scaffolding. Requirements to prevent falls that apply only to these workers are addressed separately below. **Note:** Except where indicated, these requirements also apply to manually propelled, pump jack, ladder jack, tube and coupler, and pole scaffolds, as well as the specialty scaffolds described in the Supported Scaffolds training module.



- a. General
- b. Ladders
- c. Integral (Built-in) Access
- d. Ramps and Walkways
- e. Direct Access
- f. Erectors or Dismantlers
- g. Competent Persons

a. General

- Employees must be able to **safely access any level** of a scaffold that is 2 feet above or below an access point. [\[1926.451\(e\)\(1\)\]](#)
- OSHA standards specifically forbid **climbing cross-braces** as a means of access. [\[1926.451\(e\)\(1\)\]](#)



Improper Access Leads to Serious Injuries

Case Report from OSHA files

- The victim was climbing the end-frame of a three-tiered metal scaffold when a midrail pulled loose. He fell approximately 12 feet to a concrete dock. He suffered multiple fractures to the head, left and right foot, and left wrist, and torn ligaments in the knees.
-

c. Ladders

- Portable, hook-on, and attachable ladders must be **positioned so as not to tip** the scaffold.
[1926.451(e)(2)(i)]
- Hook-on and attachable ladders must be specifically **designed for use with the type of scaffold** on which they are used. [1926.451(e)(2)(iv)]
- Hook-on and attachable **ladder rungs** shall:
 - Be positioned so that their **bottom rung** is not more than 24 inches above the scaffold supporting level. [1926.451(e)(2)(ii)]
 - Have **uniform spacing** between rungs of a maximum 16¾ inches. [1926.451(e)(2)(vi)]
 - Have **minimum rung length** of 11½ inches. [1926.451(e)(2)(v)]
 - Have **rest platforms** provided at a maximum of 35-foot vertical intervals. [1926.451(e)(2)(iii)]
- Stairway-type ladders shall:
 - Be positioned so that their **bottom step** is not more than 24 inches above the scaffold supporting level, [1926.451(e)(3)(i)]
 - Have **rest platforms** at maximum vertical intervals of 12 feet, [1926.451(e)(3)(ii)]
 - Have a **minimum step width** of 16 inches, except for mobile scaffold stairway-type ladders, which shall have a minimum step width of 11½ inches [1926.451(e)(3)(iii)], and
 - Have **slip-resistant treads** on all steps and landings. [1926.451(e)(3)(iv)]
- Steps and rungs of ladders and stairway-type ladders shall **line up vertically with each other** between rest platforms. [1926.451(e)(7)]

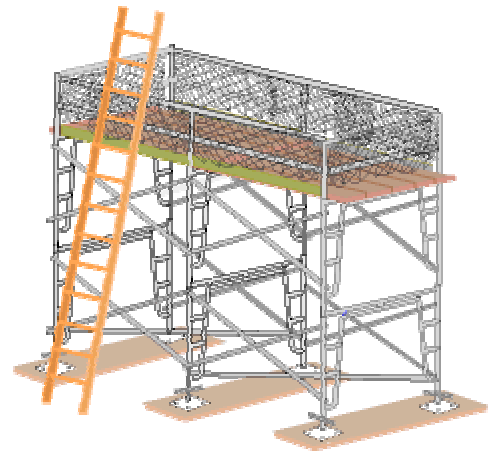
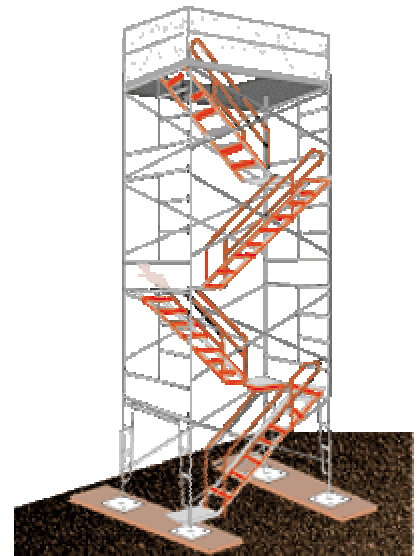


Figure 1. Example of a frame scaffold with portable ladder for access. Could it tip the scaffold?

c. Integral (Built-in) Access

- Integral (built-in) scaffold access frames must:
 - Be **specifically designed and constructed** for use as ladder rungs. [1926.451(e)(6)(i)]
 - **Not be used as work platforms** when rungs are less than 11½ inches in length, unless each affected employee uses **appropriate fall protection**. [1926.451(e)(6)(iii)]
 - Have rungs which are **uniformly spaced** and a length of at least 8 inches, with a maximum **space between rungs** of 16¾ inches. [1926.451(e)(6)(ii), (iii), (iv) and 1926.451(e)(2)(vi)]
 - Have **rest platforms** provided at a maximum of 35 foot vertical intervals. [1926.451(e)(6)(v)]
- Stair towers (scaffold stairway/towers) must have:



- A **stair rail consisting of a toprail and a midrail** on each side of the stairway. [[1926.451\(e\)\(4\)\(i\)](#)]
- A toprail of each stair rail system **capable of serving as a handrail**, unless a separate handrail is provided. [[1926.451\(e\)\(4\)\(ii\)](#)]
- **Sufficient handhold** on handrails, and toprails serving as handrails, for employees grasping them **to avoid falling**. [[1926.451\(e\)\(4\)\(iii\)](#)]
- employees, and to **prevent snagging of clothing**. [[1926.451\(e\)\(4\)\(iv\)](#)]
- Ends of stair rails and handrails constructed so that they **do not constitute a projection hazard**. [[1926.451\(e\)\(4\)\(v\)](#)]
- A **space of at least 3 inches** between handrails, or stair rails used as handrails, and other objects. [[1926.451\(e\)\(4\)\(vi\)](#)]
- A **distance of no less than 28 inches and no more than 37 inches** from the upper surface of the stair rail to the forward edge of the tread, in line with the face of the riser. [[1926.451\(e\)\(4\)\(vii\)](#)]
- A **landing platform** at least 18 inches wide by 18 inches long at each level. [[1926.451\(e\)\(4\)\(viii\)](#)]
- A scaffold stairway **width of at least 18 inches** between stair rails. [[1926.451\(e\)\(4\)\(ix\)](#)]
- **Slip-resistant surfaces** on treads and landings. [[1926.451\(e\)\(4\)\(x\)](#)]
- Stairways installed between **40 degrees and 60 degrees from the horizontal**. [[1926.451\(e\)\(4\)\(xi\)](#)]
- Guardrails meeting OSHA requirements [see [1926.451\(g\)\(4\)](#)] on the **open sides and ends** of each landing. [[1926.451\(e\)\(4\)\(xii\)](#)]
- **Uniform riser height**, within ¼-inch, for each flight of stairs. Greater variations in riser height are allowed for the top and bottom steps of the entire system (not for each flight of stairs). [[1926.451\(e\)\(4\)\(xiii\)](#)]
- **Uniform tread depth**, within ¼-inch, for each flight of stairs. [[1926.451\(e\)\(4\)\(xiv\)](#)]

d. Ramps and Walkways

- Ramps and walkways 6 feet or more above lower levels must have **guardrails that comply with 1926 Subpart M - Fall Protection**. [[1926.451\(e\)\(5\)\(i\)](#)]

No ramp or walkway shall **incline more than 1:3** (1 vertical to 3 horizontal, or 20 degrees above the horizontal). [[1926.451\(e\)\(5\)\(ii\)](#)]

If a ramp or walkway has a slope of more than 1:8, it must have **cleats securely fastened to the planks** not more than 14 inches apart, to provide footing. [[1926.451\(e\)\(5\)\(iii\)](#)]

e. Direct Access

- Direct access to or from another surface is permitted only when the scaffold is **not more than 14 inches horizontally and not more than 24 inches vertically from the other surface**. [[1926.451\(e\)\(8\)](#)]

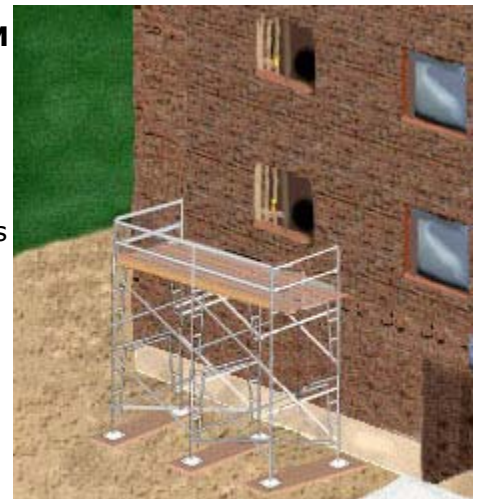


Figure 2. Example of direct access.

f. Erectors or Dismantlers

- Employers are required to **provide safe access** for employees erecting or dismantling supported scaffolds **where it is feasible, and where it does not create a greater hazard.** [1926.451(e)(9)(i)]
- Hook-on or attachable ladders shall be installed as soon as scaffold erection has progressed to the point that **permits safe installation and use** (Figure 4). [1926.451(e)(9)(ii)]
- When erecting and dismantling tubular, welded-frame scaffolds, end **frames may be used as climbing devices** for access, provided that: [1926.451(e)(9)(iii)]
 - **Horizontal members** are parallel, level, and not more than 22 vertical inches apart.
 - They are erected in a manner that creates a **usable ladder** and provides **good hand hold and foot space.**
- **Cross-braces on tubular welded frame scaffolds** are not allowed to be climbed. [1926.451(e)(9)(iv)]

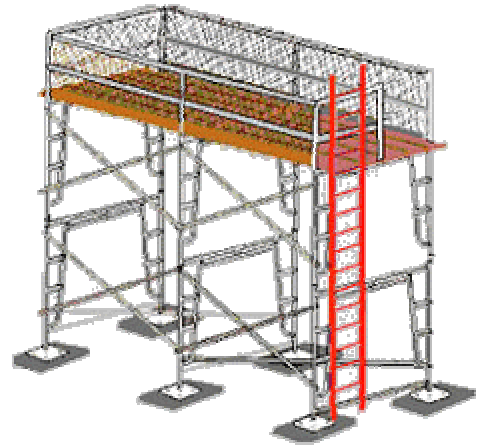


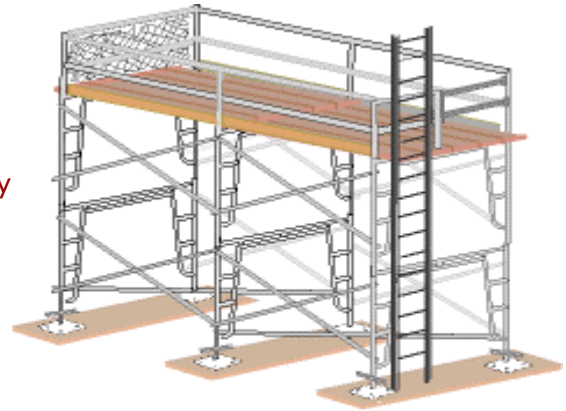
Figure 3 Install ladder as soon as

g. Competent Persons

- The competent person is **responsible for determining the safety and feasibility** of installing and using safe means of access, based on site conditions and the type of scaffold involved. [1926.451(e)(9)(i)]

Fall Protection

The number one scaffold hazard is worker falls. Fall protection consists of either personal fall-arrest systems or guardrail systems, and must be provided on any scaffold 10 feet or more above a lower level. Specific requirements are described below. **Note:** Except where indicated, these requirements also apply to manually propelled, pump jack, ladder jack, tube and coupler, and pole scaffolds, as well as the specialty scaffolds described in the Supported Scaffolds training module.



- a. General
- b. Fall-Arrest Systems
- c. Guardrail Systems
- d. Erectors and Dismantlers
- e. Competent Person

a. General

- Each employee on a scaffold more than 10 feet above a lower level must be **protected from falling** to that lower level. [[1926.451\(g\)\(1\)](#)]
- Fall protection consists of either **personal fall arrest systems or guardrail systems** meeting OSHA requirements. [[1926.451\(g\)\(1\)\(vii\)](#)]
- Employees performing **overhand bricklaying operations** from a supported scaffold must be protected from falling from all open sides and ends of the scaffold, except at the side next to the wall being laid. [[1926.451\(g\)\(1\)\(vi\)](#)]

b. Fall-Arrest Systems

- In addition to meeting the requirements of [1926.502\(d\)](#), personal fall-arrest systems used on scaffolds are to **be attached by lanyard to a vertical lifeline, horizontal lifeline, or scaffold structural member**. [[1926.451\(g\)\(3\)](#)]
 - When vertical lifelines are used, they must be fastened to a **fixed safe point of anchorage, independent of the scaffold**, and be **protected from sharp edges and abrasion**. Safe points of anchorage include structural members of buildings, but not standpipes, vents, electrical conduit, etc., which may give way under the force of a fall. [[1926.451\(g\)\(3\)\(i\)](#)]
 - It is dangerous and therefore impermissible for two or more vertical lifelines to be **attached to each other, or to the same point** of anchorage. [[1926.451\(g\)\(3\)\(iv\)](#)]
 - When **horizontal lifelines** are used, they are to be secured to **two or more structural members** of the scaffold. [[1926.451\(g\)\(3\)\(ii\)](#)]



Figure 1. An example of fall-arrest systems. Note that this worker is wearing a safety belt, whereas the new standard requires a full body harness.

c. Guardrail Systems

- Guardrail systems must be installed along all **open sides and ends of platforms**, and must be in place before the scaffold is released for use by employees other than erection/dismantling crews. [1926.451(g)(4)(i)]
- **Walkways located within a scaffold** must have guardrail systems installed within 9½ inches of and along at least one side of the walkway. [1926.451(g)(1)(v)]
- Each **toprail** or equivalent member of a guardrail system must be able to **withstand a force of at least 200 pounds** applied in any downward or horizontal direction, at any point along its top edge. [1926.451(g)(4)(vii)]
 - The **top edge height of toprails** on supported scaffolds must be between 36 inches and 45 inches.
 - **When conditions warrant**, the height of the top edge **may exceed the 45-inch height**, provided the guardrail system meets all other criteria. (Note: The minimum top edge height on scaffolds manufactured or placed in service after January 1, 2000 is 38 inches). [1926.451(g)(4)(ii)]
- **Midrails, screens, mesh, intermediate vertical members, solid panels**, etc., must be able to **withstand a force of at least 150 pounds** applied in any downward or horizontal direction, at any point along the midrail or other member. [1926.451(g)(4)(ix)]
 - When **midrails** are used, they must be **installed at a height approximately midway** between the top edge of the guardrail system and the platform surface. [1926.451(g)(4)(iv)]
 - When **screens and mesh** are used, they must **extend from the top edge** of the guardrail system to the scaffold platform, and along the entire opening between the supports. [1926.451(g)(4)(v)]

- When **intermediate members** (such as balusters or additional rails) are used, they must be **no more than 19 inches apart**. [[1926.451\(g\)\(4\)\(vi\)](#)]
- Guardrails must be **surfaced to prevent punctures or lacerations to employees** and to **prevent snagging of clothing**, which may cause employees to lose their balance. [[1926.451\(g\)\(4\)\(xi\)](#)]
- Ends of rails may not **extend beyond their terminal posts**, unless they do not constitute a projection hazard to employees. [[1926.451\(g\)\(4\)\(xii\)](#)]
- In lieu of guardrails, **crossbracing may serve as a toprail or midrail**, providing the crossing point is:
 - Between 20 and 30 inches above the work platform for a midrail, or
 - Between 38 and 48 inches above the work platform for a toprail. [[1926.451\(g\)\(4\)\(xv\)](#)]
- For other scaffolding guardrail requirements, see [1926.451\(g\)\(4\)](#).



Employee is Pulled off Scaffold, Suffers Injuries. Guardrails May Have Saved Him.

Case Report from OSHA files

- While sitting or kneeling on a fixed deck plank attached to a fabricated frame scaffold, a worker was pulling a 16-foot long 2x4 off the bucket of an excavator. There were no guardrails at the working level. When the other end of the 2x4 slipped off the bucket, the employee did not let go of his end, and was pulled off the deck. He fell 16 feet to the ground, sustaining facial fractures and other injuries.
-



Figure 2. Obvious violations: No guard rail and no fall arrest system. Also scaffold is six tiers high , it must be tied into the building.



Figure 3. Violation: Scaffold has X-brace that can act as a top rail, but a midrail and toe boards are still required. Also, these workers are not wearing fall protection, and there is a mortarboard on the cantilevered platform, in violation of [1926.452\(c\)\(5\)\(iii\)](#)

d. Erectors and Dismantlers

- Employers are required to provide fall protection for employees erecting or dismantling supported scaffolds where it is feasible, and where installing and using it does not create a greater hazard. [[1926.451\(g\)\(2\)](#)]

e. Competent Person

- The employer must **designate a competent person**, who would be **responsible for determining the feasibility and safety** of providing fall protection for employees erecting or dismantling supported scaffolds. [[1926.451\(g\)\(2\)](#)]

5. Platform

Except when used only as a walkway, the platform is the work area of the scaffold. Therefore, an inspection of a scaffold platform requires safety checks of both the platform structure and how the platform is used by the workers. **Note:** Except where indicated, these requirements also apply to manually propelled, pump jack, ladder jack, tube and coupler, and pole scaffolds, as well as the specialty scaffolds described in the Supported Scaffolds training module.



- a. Planking
- b. Working Distance
- c. Overlap
- d. Brackets
- e. Capacity
- f. Falling Object Protection

Planking

- Each platform must be **fully planked or decked** between the front uprights and the guardrail supports (see [Figure 1](#) and [Figures 2 and 3](#)). [[1926.451\(b\)\(1\)](#)]
- Platforms used solely as **walkways**, or **during erection or dismantling**, require only the planking that the employer establishes is necessary to provide safe working conditions. [[1926.451\(b\)\(1\)\(ii\)](#)]
- **No gaps greater than 1 inch** are permitted between adjacent planks or deck units, or between the platform and the uprights, unless the employer can demonstrate that a wider space is necessary. In such cases, the gap will be as small as possible and not exceed 9½ inches. [[1926.451\(b\)\(1\)\(i\)](#) and [\(ii\)](#)]
- Wooden planking must not be covered with **opaque finishes**, except that platform edges may be marked for identification. Platforms may be coated periodically with wood preservatives, fire retardants, and slip-resistant finishes, provided they do not obscure the top or bottom wood surfaces. [[1926.451\(b\)\(9\)](#)] **Note: For more on wooden planking, see [Planking](#).**
- Scaffold platforms and walkways must be **at least 18 inches wide**, unless they are used in areas that the employer can demonstrate are so narrow that they must be less than 18 inches wide. In such cases, the platforms must be as wide as feasible, and fall protection must be provided. [[1926.451\(b\)\(2\)\(ii\)](#)]
- Nothing that could cause a **slip, trip or fall** (i.e. tools, scrap material, chemicals, snow, ice, etc.) is allowed to accumulate on the platform. [[1926.451\(f\)\(8\)](#) and [1926.451\(f\)\(13\)](#)]

Tip: For the same reason, cleats or other means of connecting planks should be on the underside.

- When **moving platforms to the next level**, the existing platform must be left undisturbed until the new end frames have been set in place and braced. [[1926.452\(c\)\(1\)](#)]

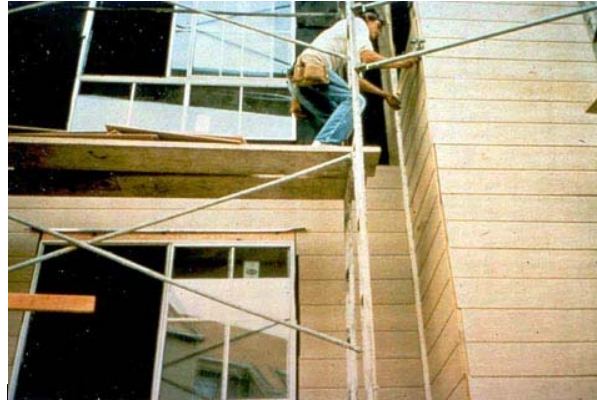


Figure 1. Example of a scaffold that is not fully planked. Also planks are not cleated or otherwise secured against displacement. There is also more than a 14-inch gap between the building and the scaffold platform, no

b. Working Distance

- For most activities, there must be **no more than a 14-inch gap** between the scaffold platform and the structure being worked on. For lathing and plastering, a gap of 18 inches is permitted ([Figure 1](#)). [[1926.451\(b\)\(3\)](#) and [1926.451\(b\)\(3\)\(ii\)](#)]

c. Overlap

- To prevent slippage, **platforms must be cleated** or otherwise restrained at each end, or else **overlap centerline support** at least 6 inches ([Figure 1](#)). [[1926.451\(b\)\(4\)](#)]
- Unless it is designed and installed to support employees and materials without tipping, or has guardrails that block employee access, each **end of a platform may not extend over its support** more than 12 inches (for platforms 10 feet or shorter in length) or more than 18 inches (for platforms more than 10 feet long). [[1926.451\(b\)\(5\)](#)]
- On scaffolds where platforms are **overlapped to create a long platform**, the overlap may only occur over supports, and may not be less than 12 inches, unless the platforms are restrained (i.e., nailed together) to prevent movement. [[1926.451\(b\)\(7\)](#)]
- On scaffolds where platforms are **abutted to create a long platform**, each abutted end must rest on a separate support surface (this does not preclude the use of shared support members such as "T" sections, hook-on platforms that rest on common supports, etc.). [[1926.451\(b\)\(6\)](#)]
- When platforms must overlap because a **scaffold changes direction**, such as turning a corner, platforms that rest on a bearer at an angle other than a right angle shall be laid first,

and platforms that rest at right angles over the same bearer shall be laid second, on top of the first platform. [[1926.451\(b\)\(8\)](#)]



Planking Not Overlapped, Causes Fatal Fall

Case Report from OSHA files

- An employee fell about 60 feet through the decking of a work platform on a tubular welded frame scaffold. The decking consisted of plywood sheets, 4' x 8' by 3/4" thick, covering an opening about 28" wide x 24' long. They were not overlapped over the supporting sides, were not secured, and were not strong enough to hold the weight of the victim, who was killed by the fall.
-

d. Brackets

- When brackets are used to support **cantilevered platforms**, they must:
 - Be **seated** with side-brackets parallel to the frames, and end-brackets at 90 degrees to the frames. [[1926.452\(c\)\(5\)\(i\)](#)]
 - Be used **only to support personnel**, unless the scaffold has been designed for other loads by a qualified engineer and built to withstand the tipping forces caused by other loads. [[1926.452\(c\)\(5\)\(iii\)](#)]

e. Capacity

- Scaffold platforms must be able to **support** their own weight, plus **four times the maximum intended load**. [[1926.451\(a\)\(1\)](#)]
- Do not load the scaffold or any component parts **beyond their maximum capacity** (their own weight and 4:1 the maximum intended load). A scaffold can be overloaded by:
 - Too many people being on the platform,
 - Too much material being stored on the platform, and
 - Point loading, or concentrating too much of the load in one area ([Figures 2 and 3](#)). [[1926.451\(f\)\(1\)](#)]



Figures 2 and 3. Planking on this platform should be six planks wide, instead of only two. Also, note that the planks are bowing because the bricks are loaded at one point on the platform instead of being evenly distributed.

f. Falling Object Protection

There are two kinds of falling object hazards associated with scaffolds. One concerns the employees on the scaffold itself, and the other concerns employees who may work in or enter the area below the scaffold.

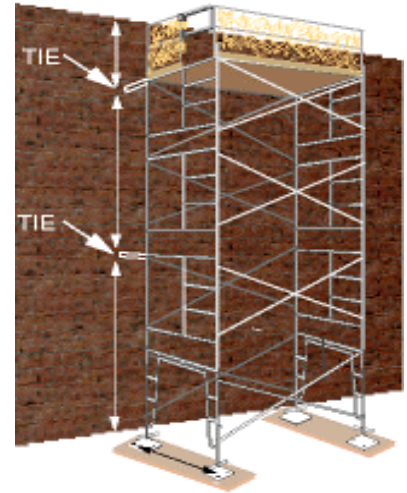
- Each **employee on a scaffold** must be protected from falling hand tools, debris, and other small objects, by:
 - **Hardhats;**
 - **Toeboards**, screens, or guardrail systems;
 - **Debris nets or canopy structures** that contain or deflect falling objects; and,
 - **Placement of potential falling objects** away from the edge of the surface from which they may fall when the falling objects are too large, heavy or massive to be contained or deflected by any of the above-listed measures. [[1926.451\(h\)\(1\)](#)]
- Where there is a danger of tools, materials, or equipment falling from a scaffold onto **employees below**, they must be protected by:
 - The area below the scaffold being **barricaded** so employees are not permitted to enter; or
 - **Toeboards** being installed along the edge of platforms more than 10 feet above lower levels.
 - Where tools, materials, or equipment are piled to a height higher than the top edge of the toeboard, they should be prevented from falling by **paneling or screening** extending from the toeboard to the top of the guardrail; or
 - A **guardrail system** shall be installed with openings small enough to **contain the objects**; or

- The employer must **designate a competent person**, who would be **responsible for determining the feasibility and safety** of providing fall protection for employees erecting or dismantling supported scaffolds. [[1926.451\(g\)\(2\)](#)]
 - A **canopy structure, debris net, or catch platform** strong enough to withstand the impact of the potential falling objects shall be erected over the employees. [[1926.451\(h\)\(2\)](#)]
- When **toeboards** are used for **falling object protection**, they must be:
 - Able to **withstand a force of at least 50 pounds** applied in any downward or horizontal direction, at any point along the toeboard.
 - At least **3½ inches high** from the top edge to the level of the walking/working surface.
 - **Securely fastened in place** at the outermost edge of the platform, and not have more than ¼-inch clearance above the walking/working surface.
 - **Solid**, or with openings not over 1 inch. [[1926.451\(h\)\(4\)](#)]

See [Appendix A](#) of Subpart L for non-mandatory toeboard guidelines.

Keeping Upright

Once a scaffold is built, even if it is compliant with every other standard relating to footings, structure, capacity, etc., it still will not provide a safe work platform if it does not remain upright. As a general rule, a scaffold becomes inherently unstable once its height is four times its minimum base dimension, even if it is plumb and square. Extreme weather or damage to structural components can also affect a scaffold's stability. **Note: Except where indicated, these requirements also apply to manually propelled, pump jack, ladder jack, tube and coupler, and pole scaffolds, as well as the specialty scaffolds described in the Supported Scaffolds training module.**



- a. Guys, Ties and Braces
- b. Inspection
- c. Moving Scaffolds
- d. Weather

a. Guys, Ties, and Braces

- When a supported scaffold reaches a height that is more than **four times its minimum base dimension** (4:1), it must be restrained by guys, ties, or braces to **prevent it from tipping**. [[1926.451\(c\)\(1\)](#)]
 - Guys, ties, and braces must be installed at locations where horizontal scaffold components **support both inner and outer legs**. [[1926.451\(c\)\(1\)\(i\)](#)]
 - Guys, ties, and braces must be installed according to the scaffold manufacturer's recommendations or at the **closest horizontal member to the 4:1 height ratio** and be repeated every 20 vertical feet for narrow scaffolds (3 feet or less in width), and every 26 vertical feet for scaffolds greater than 3 feet in width. [[1926.451\(c\)\(1\)\(ii\)](#)]
 - Ties, guys, braces, or outriggers shall be used to prevent tipping of supported scaffolds bearing **eccentric loads, such as cantilevered work platforms**. [[1926.451\(c\)\(1\)\(iii\)](#)]

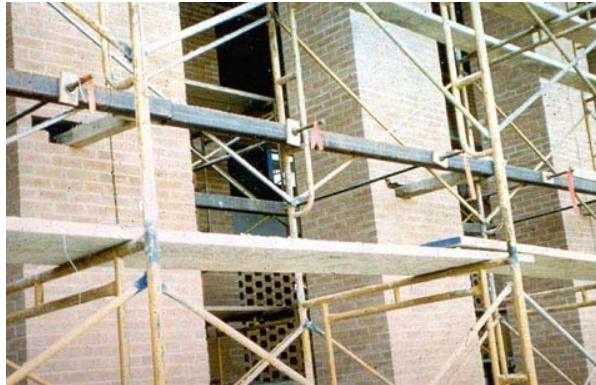


Figure 1. Good example of a scaffold braced into a building.

b. Inspection

- Scaffolds and scaffold components must be inspected for visible defects **before each shift** by a competent person, and **after each occurrence that could affect a scaffold's integrity** (such as being struck by a crane). [[1926.451\(f\)\(3\)](#)]
- Any part of a scaffold that has been damaged or weakened so that it no longer meets OSHA strength requirements must either be **repaired, replaced, braced, or removed from service**. [[1926.451\(f\)\(4\)](#)]

c. Moving Scaffolds

- Scaffolds may not be **moved horizontally while employees are on them**, unless they have been designed for that purpose by a registered professional engineer, or in the case of mobile scaffolds, where the provisions of [1926.452\(w\)](#) are followed [1926.451\(f\)\(5\)](#).

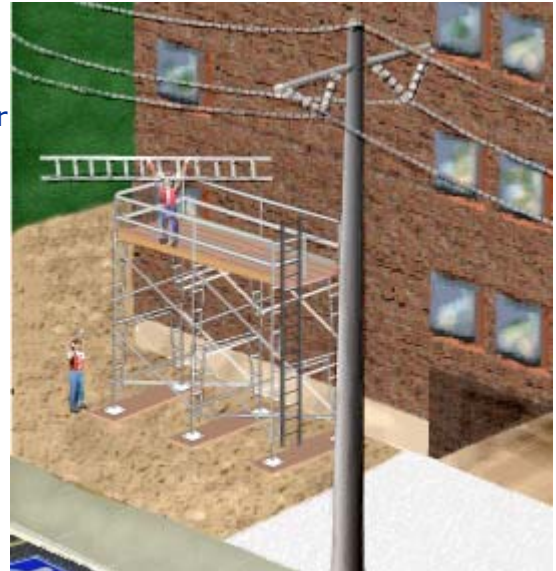
d. Weather

- Employees are not permitted to work on or from a scaffold during **storms or high wind**, unless a competent person has determined that it is safe, and those employees are protected by:
 - Personal fall arrest systems, or
 - Wind screens (when windscreens are used the scaffold must be secured against the anticipated wind forces). [[1926.451\(f\)\(12\)](#)]

Electrical Hazards

Because they may be built in proximity to overhead power lines, and because they are often made of metal, scaffolds can put workers at risk of electrocution. This risk can be removed through proper clearance and maintenance. **Note: Except where indicated, these requirements also apply to manually propelled, pump jack, ladder jack, tube and coupler, and pole scaffolds, as well as the specialty scaffolds described in the Supported Scaffolds training module.**

- a. Overhead Power lines
- b. Portable Electric Tools



a. Overhead Power Lines

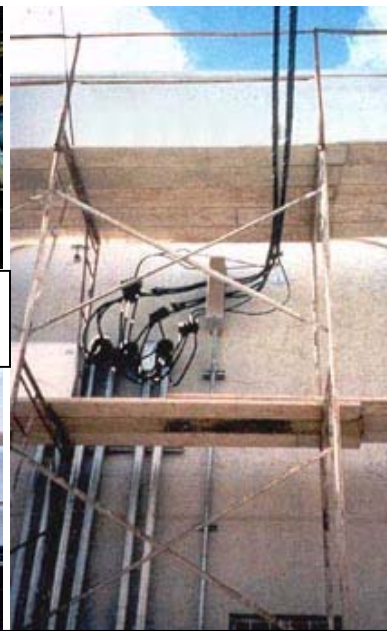
- Scaffolds must not be close enough to overhead power lines that they, or any conductive materials (e.g. building materials, paint roller extensions, scaffold components) that may be handled on them, come **closer than 10 feet to the power line.** ([Figures 2 and 3](#))
 - Exception: Insulated power lines of less than 300 volts have a safe distance of only 3 feet.

TIP: Because it may be difficult to determine if a power line is insulated, or what its exact voltage is, the 10 foot rule should always be applied.

- Scaffolds may be closer to overhead power lines than specified above **if such proximity is necessary** for the type of work being done, and if the **power company or electrical system operator has been notified** and has either:
 - De-energized the lines ([Figure 1](#));
 - Relocated the lines;
 - Installed protective coverings to prevent accidental contact with the lines. [[1926.451\(f\)\(6\)](#)]



Figure 1. Example of powerlines that have been grounded.



Figures 2 and 3. Example of scaffold being built dangerously close to power lines.

Additional images

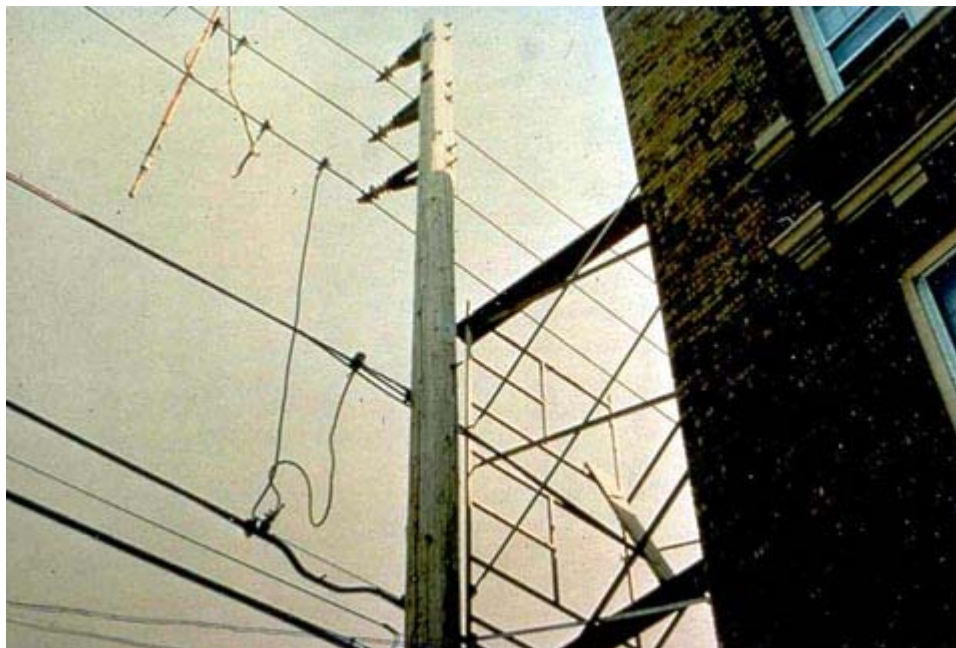


Figure 4. Example of powerlines that have been grounded.

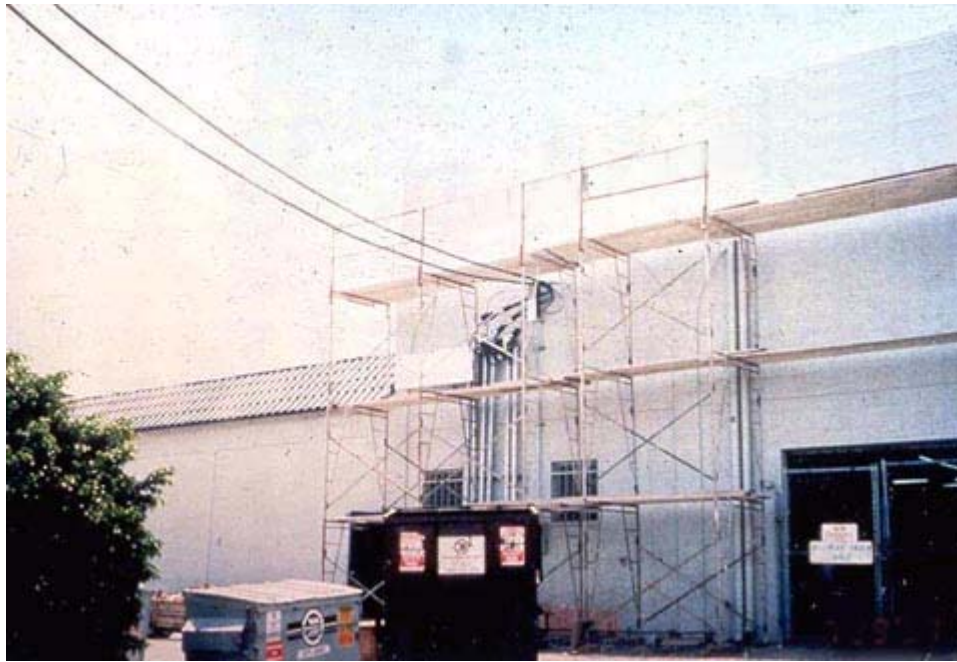


Figure 5. Example of scaffold being built dangerously close to power lines.



Figure 6. Example of scaffold being built dangerously close to power lines.



Figure 7. Scaffold near powerlines that have been grounded



Figure 8. Scaffold built too close to powerline



Figure 9. Powerlines being shielded by utility worker

b. Portable Electric Tools

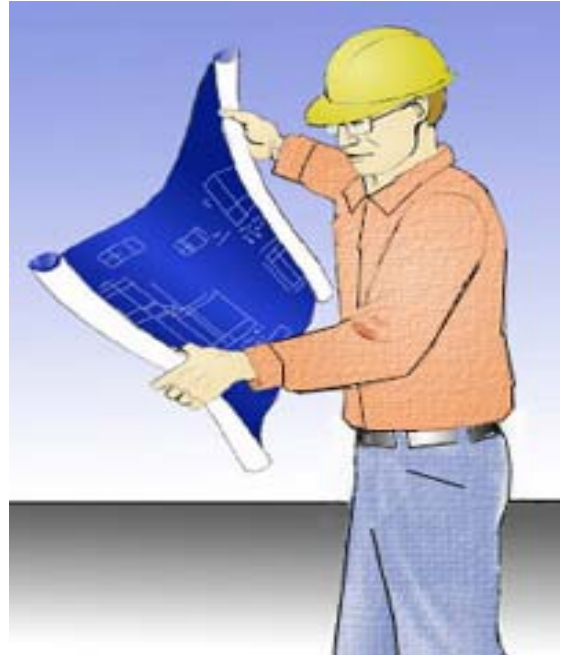
- Because metal frame scaffolds are conductive, power tools, cords, etc., that suffer insulation failure can electrify the entire scaffold. This poses a risk of electrocution not just to the worker holding the tool, but to everyone who contacts the scaffold. Therefore, all **portable electric equipment must be protected** by:
 - GFCIs (ground-fault circuit interrupters), or
 - an AEGCP (assured equipment grounding conductor program, in accordance with [1926.404\(b\)\(1\)\(i\)](#) (see [OSHA Construction eTool](#))).

TIP: Often, a worker who is shocked survives the current, only to lose balance and be killed in a fall. This is one more reason for always using fall protection.

Personnel Training and Competent Persons

Critical to scaffolding safety are the use of competent persons for the design, erection/dismantling, and maintenance of scaffolds, and trained workers for their use. Therefore, assessing personnel abilities should be a part of all phases of the scaffolding inspection. **Note:** Except where indicated, these requirements also apply to manually propelled, pump jack, ladder jack, tube and coupler, and pole scaffolds as well as the specialty scaffolds described in the Supported Scaffolds training module.

- a. [Design and Erection](#)
- b. [Training](#)



a. Design and Erection

- Scaffolds must be **designed by a qualified person**, and be constructed and loaded in accordance with that design ([Figure 1](#)). [[1926.451\(a\)\(6\)](#)]
- Scaffolds are to be **erected, moved, dismantled, or altered** only under the **supervision of a competent person** qualified in such activities. [[1926.451\(f\)\(7\)](#)]
- Scaffolds over 125 feet (38.0 m) in height above their base plates shall be designed by a **registered professional engineer**, and shall be constructed and loaded in accordance with such design. [[1926.452\(c\)\(6\)](#)]
- Non-mandatory **examples of criteria** that will enable an employer to comply with [1926.451\(a\)](#) are contained in [1926 Subpart L Appendix A](#).



Figure 1. Scaffold that was not constructed and loaded in accordance with design.



Worker Dies During Scaffold Erection

Case Report from OSHA files

- An employee was constructing the third level of a tubular, welded-frame scaffold while standing on the second level. The scaffold was constructed on a poured concrete floor and had been leveled. Each section of the framework measured 6'5" high. The working surface was solidly planked. When the employee tried to set the third level frame into the pins of the second level, the frame he was trying to position flipped to one side. The momentum of the frame thrust the employee backward off the second level. He fell to the ground, sustaining a fatal blow to his head.
-

b. Training

- Scaffolds are to be **erected, moved, dismantled, or altered** only by **experienced and trained employees** who have been selected for that work by the competent person. [\[1926.451\(f\)\(7\)\]](#)
- Employees who are involved in activities such as **erecting, dismantling, repairing, and inspecting scaffolds** must be trained by a competent person to **recognize any hazards** associated with those activities. Training shall include:
 - The **nature** of scaffold hazards;
 - **Correct procedures** for erecting, disassembling, etc. the type of scaffold in question;
 - The design criteria, maximum intended load capacity, and intended use of the scaffold; and
 - Any other **pertinent requirements**. [\[1926.454\(b\)\]](#)
- Employees who **perform work while on a scaffold** must be trained by a qualified person to **recognize the hazards** associated with the type of scaffold being used, and to **understand the procedures to control those hazards**. Training shall include:
 - The **nature** of any electrical hazards, fall hazards, and falling object hazards in the work area;
 - The **correct procedures** for dealing with those hazards;
 - The **proper use of the scaffold**, and the **proper handling of materials** on the scaffold;
 - The maximum intended load and the **load-carrying capacity of the scaffold**; and
 - Any other **pertinent requirements**. [\[1926.454\(a\)\]](#)
- Employers shall retrain each employee when they have reason to believe that the **employee lacks the skill or understanding** to safely erect, use, or dismantle a scaffold. Such **retraining is required** in at least the following situations:
 - **Changes at the worksite** present a hazard for which an employee has not previously been trained;
 - **Changes in the types of scaffolds, fall protection, falling object protection, or other equipment** present a hazard for which an employee has not previously been trained; and
 - **Inadequacies in an affected employee's work** indicate that the employee has not retained the necessary proficiency. [\[1926.454\(c\)\]](#)